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(54) **ELECTRICAL CONNECTOR WITH SHIELDING PLATES WITHOUT MOUNTING TAIL AND GROUNDING MEMBER**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H01R 13/648 (2006.01)

(52) **U.S. Cl.** **439/607.09**; 439/607.11

(58) **Field of Classification Search** 439/607.09, 439/607.08, 607.11, 607.05, 607.1
See application file for complete search history.

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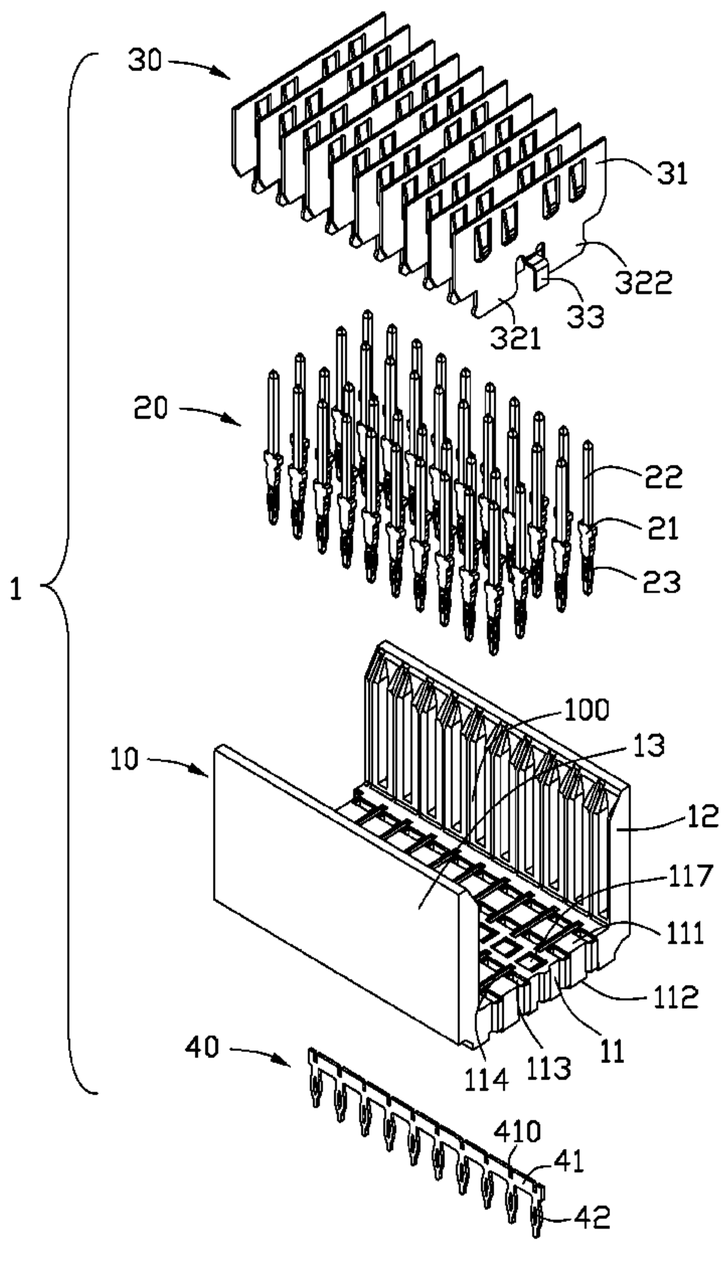
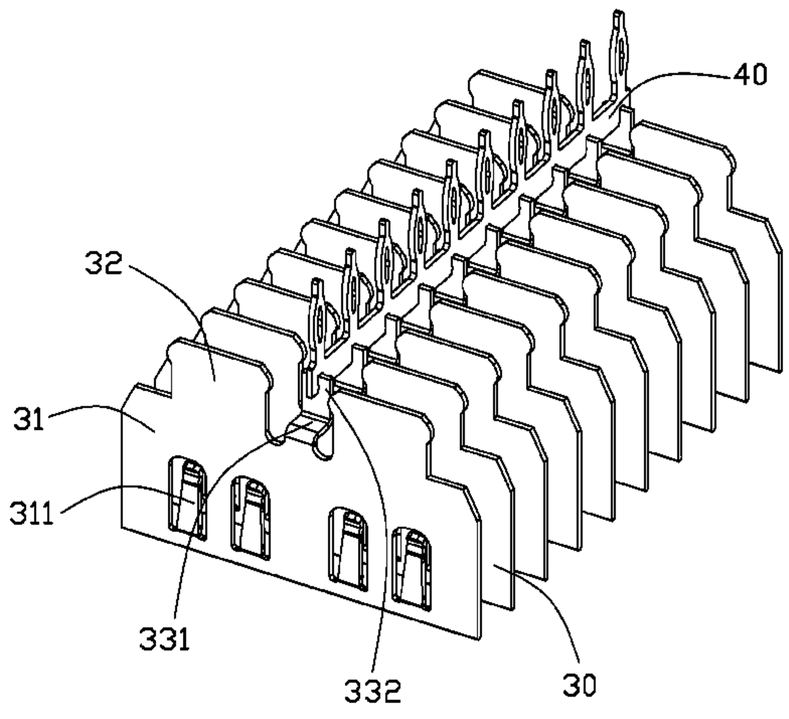
(57) **ABSTRACT**

An electrical connector includes an insulative housing, a number of signal contacts, a number of shielding plates and a grounding member touching the shielding plates so that the shielding plates are jointly connected with each other. The shielding plates are assembled to the insulative housing and disposed between the signal contacts of adjacent columns. Each shielding plate includes a tab projecting into a base of the insulative housing. No mounting tail for establishing connection between the shielding plates and a circuit board is set on any of the shielding plates. Instead, the grounding member comprises a number of mounting tails for being connected to the circuit board so as to establish electrical connection between the shielding plates and the circuit board.

20 Claims, 7 Drawing Sheets





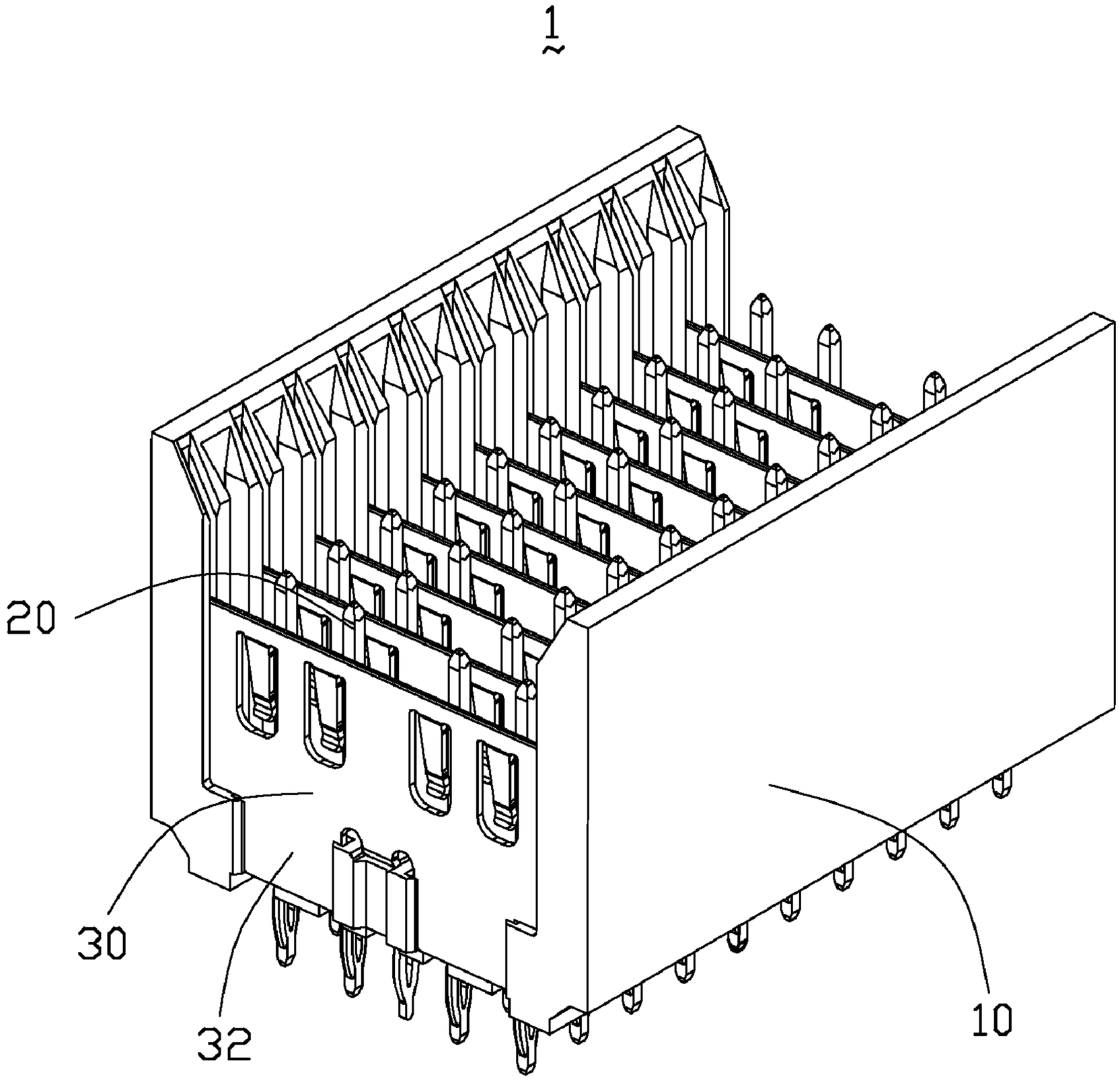


FIG. 1

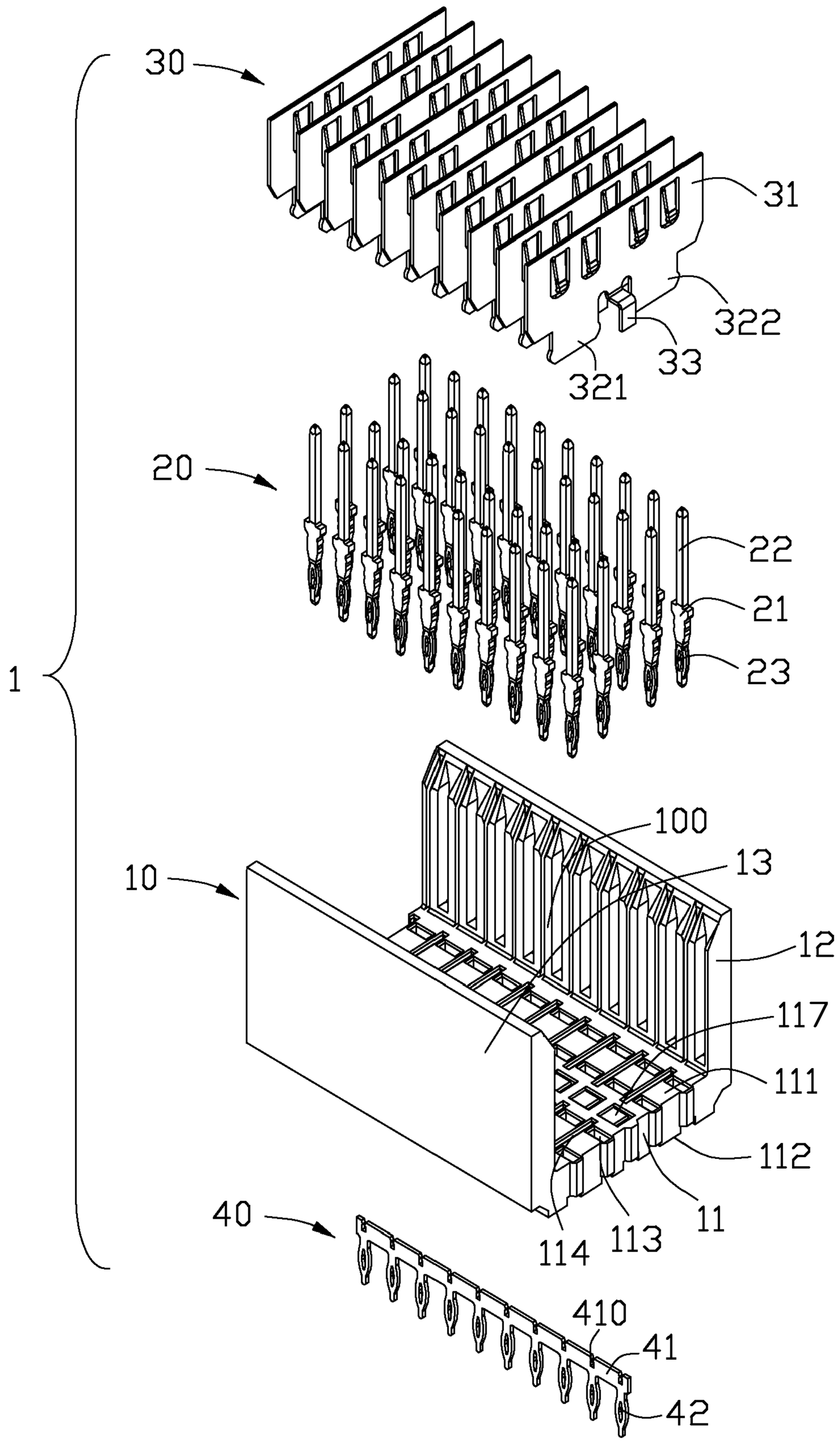

30
31
322
33
321
20
22
21
23
1
100
13
10
12
117
111
112
11
114
113
40
410
41
42

FIG. 2

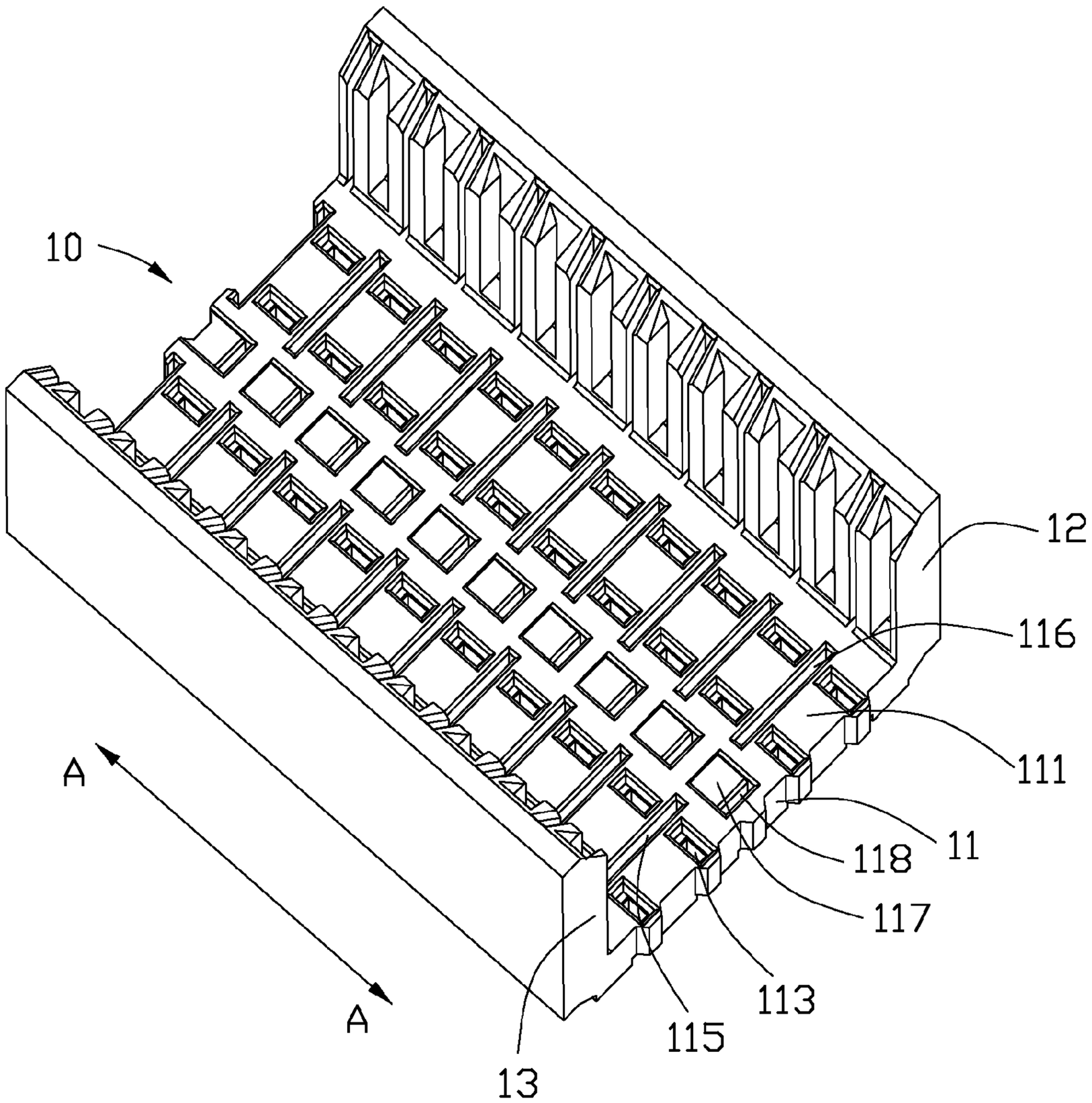


FIG. 3

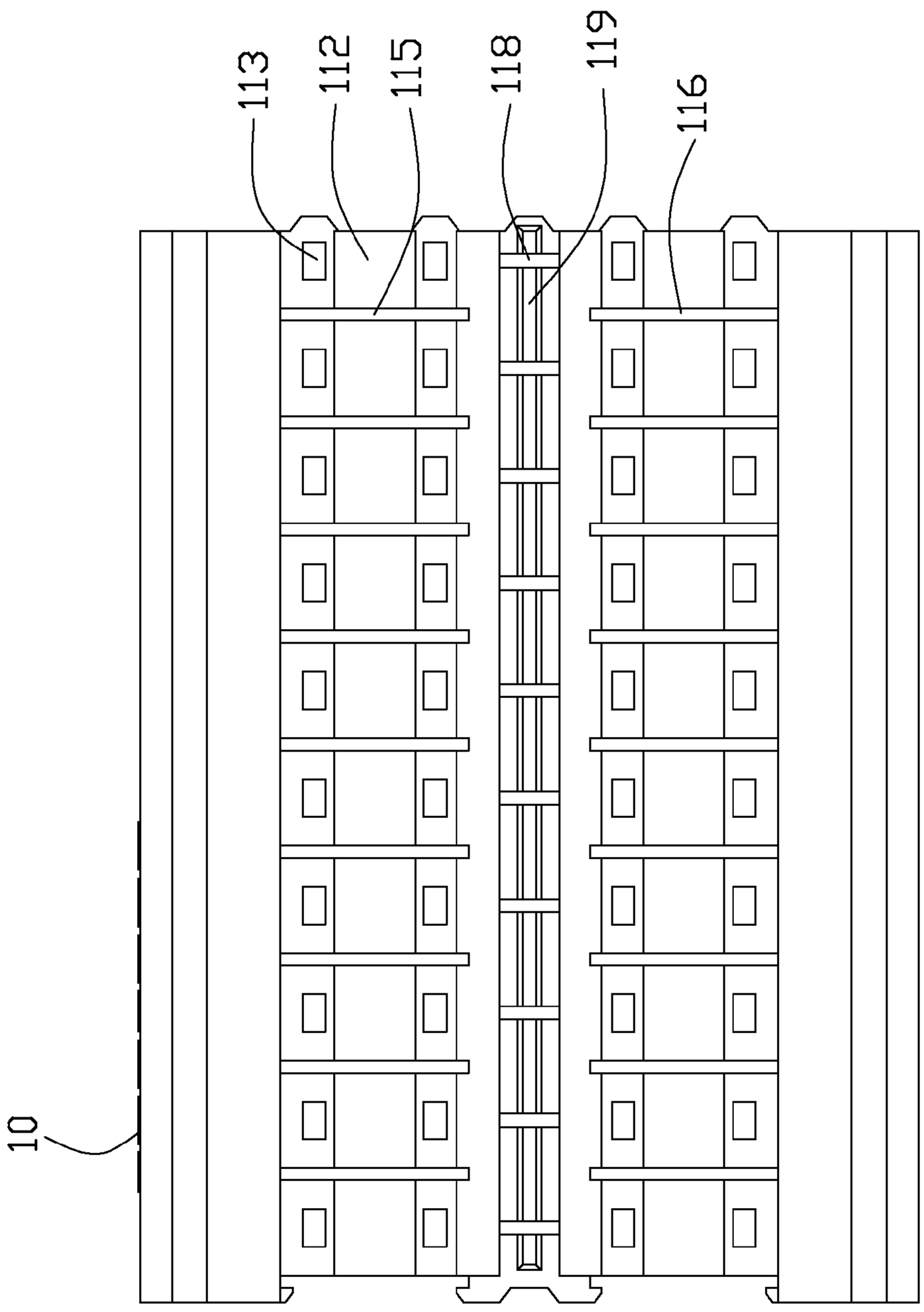


FIG. 4

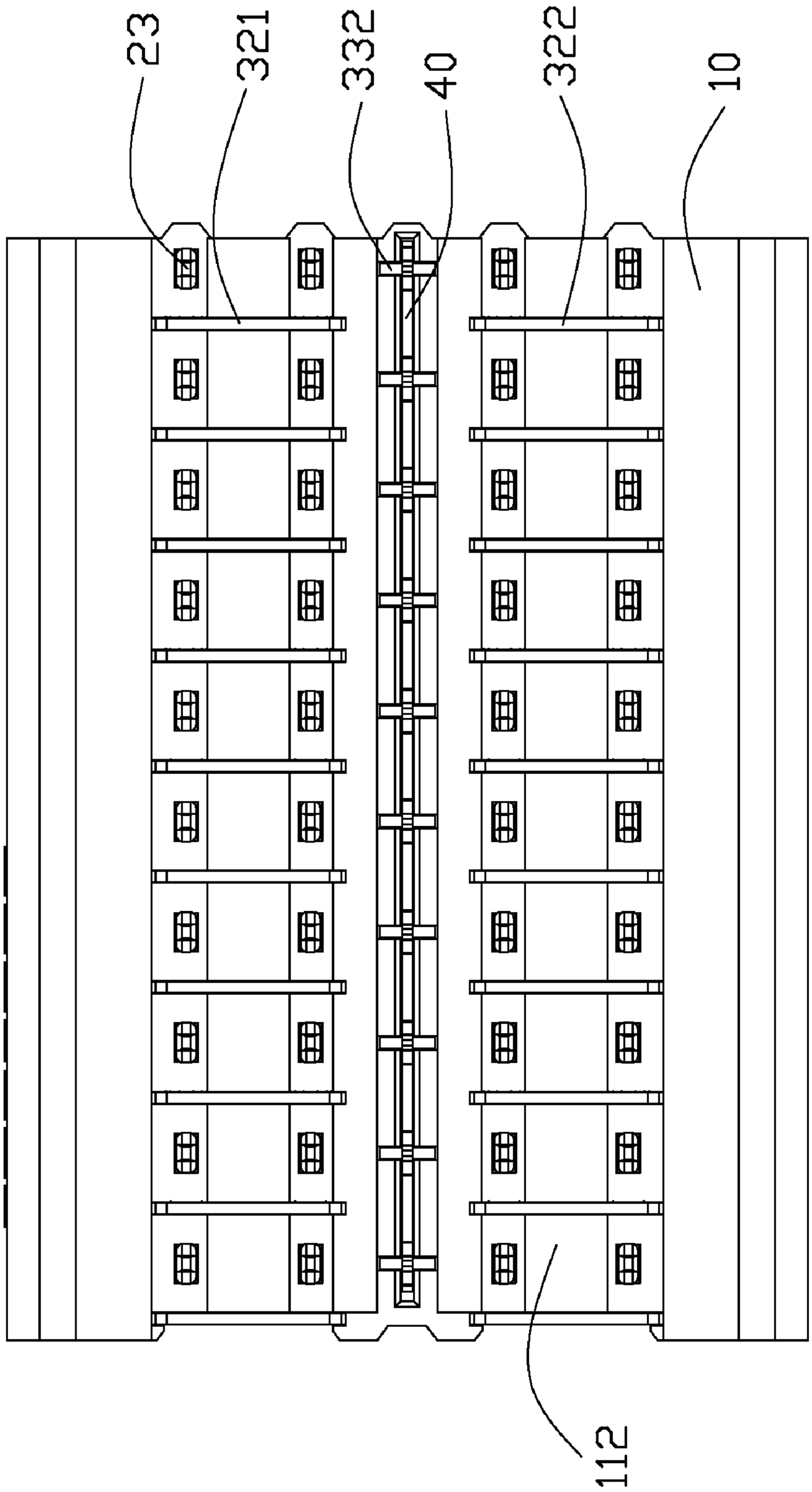


FIG. 5

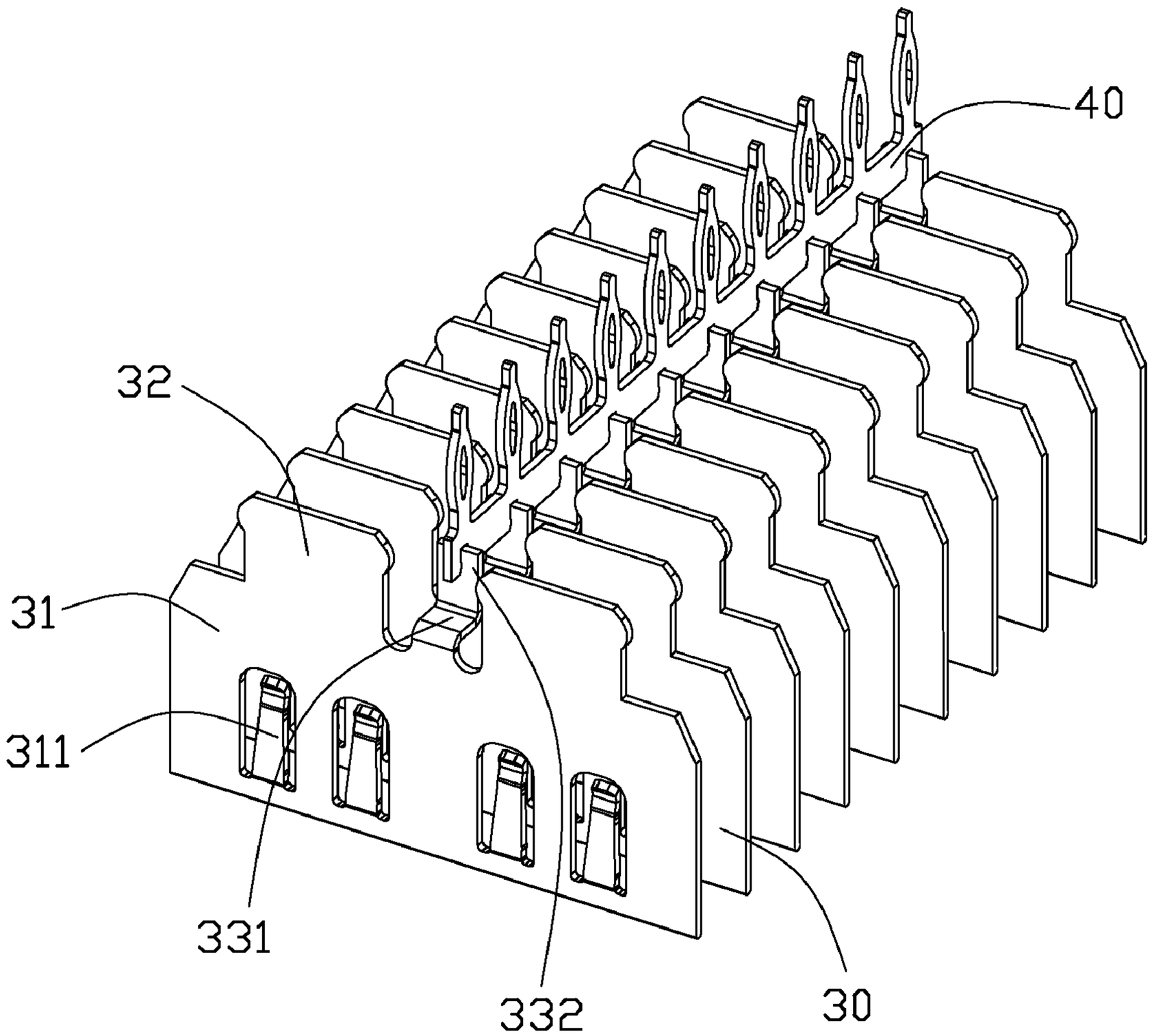


FIG. 6

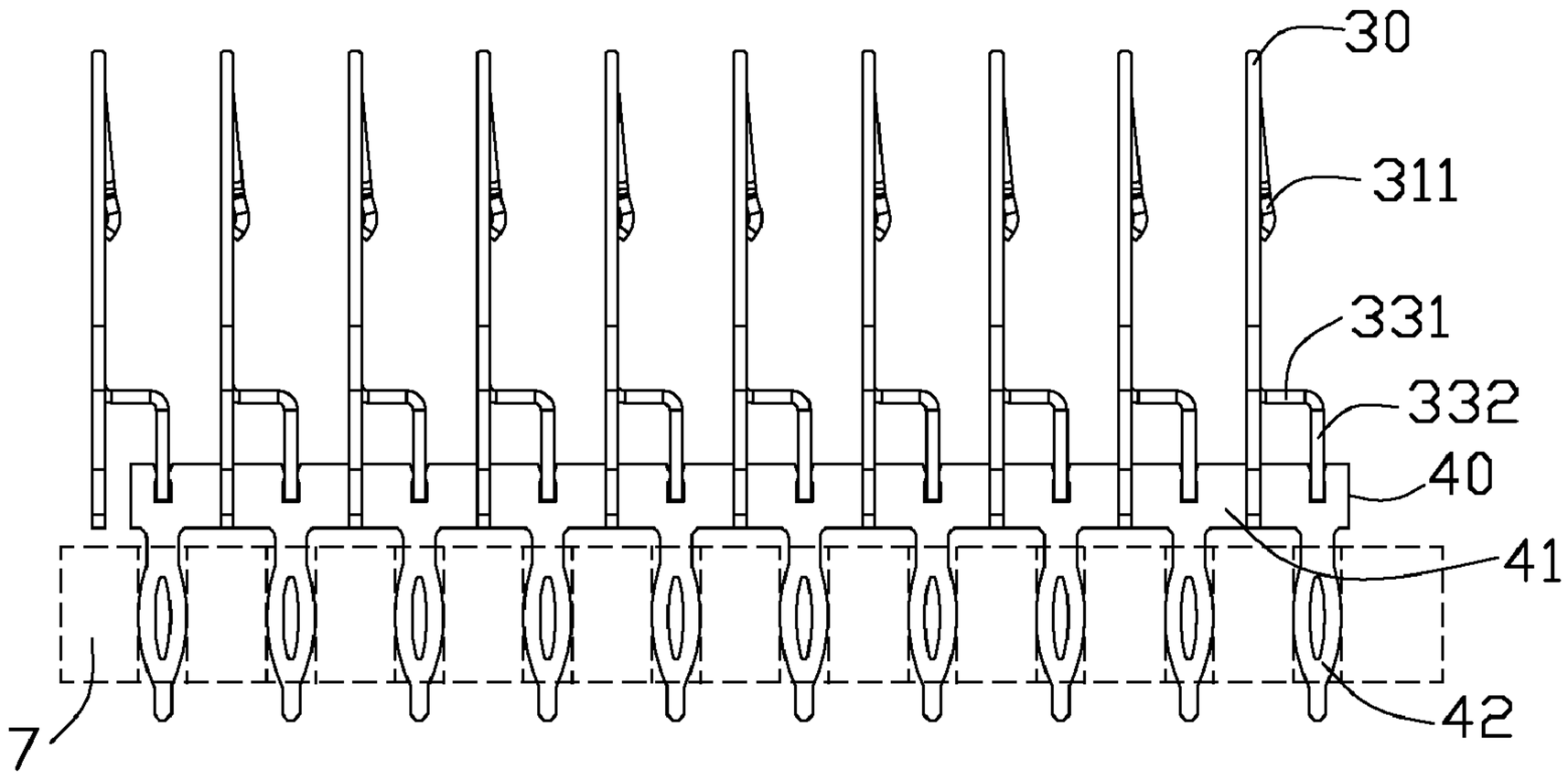


FIG. 7

ELECTRICAL CONNECTOR WITH SHIELDING PLATES WITHOUT MOUNTING TAIL AND GROUNDING MEMBER

CROSS-REFERENCE TO RELATED APPLICATIONS

Relevant subject matters are disclosed in U.S. patent application Ser. No. 12/317,863 filed on Dec. 29, 2008, now Pub. No. 2009/0170373 and is assigned to the same applicant and the same assignee with the instant invention.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electrical connector for transmitting high speed signals, and more particularly to an electrical connector having detachable shielding plates and a grounding member providing reliable and robust grounding effect.

2. Description of Related Art

U.S. Pat. No. 6,554,647 issued to Cohen on Apr. 29, 2003 discloses a high speed header connector including a U-shaped insulative housing, a plurality of signal contacts received in the insulative housing and a plurality of shielding plates disposed in parallel within the insulative housing between signal contacts in adjacent columns. Each shielding plate includes a plurality of mounting tails integrally extending therefrom for being mounted to a circuit board. However, the shielding plates are separated from each other. That is to say, each shielding plate acts as an independent grounding bus. Under this arrangement, such separate grounding buses may not provide robust shielding function in high speed signal transmission area.

Hence, an improved electrical connector is needed to solve the above problems.

BRIEF SUMMARY OF THE INVENTION

An electrical connector for being mounted on a circuit board includes an insulative housing, a plurality of signal contacts, a plurality of shielding plates and a grounding member touching the shielding plates. The insulative housing includes a base and first and second side walls extending from the base with a receiving opening disposed between the first and the second side walls. The signal contacts include contacting sections protruding beyond the base and further extending into the receiving opening. The contacting sections are arranged in parallel columns along a longitudinal direction of the insulative housing. The shielding plates are assembled to the insulative housing and disposed between the signal contacts of adjacent columns. Each shielding plate includes a tab extending into the base of the insulative housing when assembled therein. The grounding member touches the shielding plates so that the shielding plates are jointly connected with each other. No mounting tail for establishing connection between the shielding plates and the circuit board is set on any of the shielding plates. Instead, the grounding member comprises a plurality of mounting tails for being connected to the circuit board so as to establish electrical connection between the shielding plates and the circuit board.

The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a perspective view of an electrical connector in accordance with an embodiment of the present invention;

FIG. **2** is an exploded view of the electrical connector as shown in FIG. **1**;

FIG. **3** is a perspective view of an insulative housing as shown in FIG. **1**;

FIG. **4** is a bottom view of the insulative housing as shown in FIG. **3**;

FIG. **5** is a bottom view of the insulative housing with a plurality of signal contacts, shielding plates and a grounding member fixed thereto;

FIG. **6** is a perspective view of the shielding plates abutting against the grounding member; and

FIG. **7** is a side view of the shielding plates abutting against the grounding member as shown in FIG. **6**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made to the drawing figures to describe the preferred embodiment of the present invention in detail. FIGS. **1**, **2** and **7** illustrate a high speed electrical connector **1** mounted on a circuit board **7** for mating with a daughter card connector (not shown) received therein. The electrical connector **1** includes an insulative housing **10**, a plurality of signal contacts **20** secured in the insulative housing **10** in parallel columns, a plurality of shielding plates **30** located between the signal contacts **20** arranged in adjacent columns, and a grounding member **40** jointly connecting the shielding plates **30**.

Referring to FIGS. **2-5**, the insulative housing **10** has a U-shaped configuration and includes a base **11** and a pair of first and second side walls **12**, **13** extending upwardly from lateral sides of the base **11**. The first and the second side walls **12**, **13** define jointly with the base **11** a receiving opening **100** for receiving the daughter card connector. The base **11** includes a top surface **111** exposed to the receiving opening **100** and a bottom surface **112** for being mounted on the circuit board. A plurality of passageways **113** are defined through the top and the bottom surfaces **111**, **112** of the base **11** for mounting the signal contacts **20**. The passageways **113** are arranged along a longitudinal direction A-A of the insulative housing **10** as shown in FIG. **3**. Besides, a plurality of slits **114** are defined and extend from the top surface **111** to the bottom surface **112** of the base **11** for mounting the shielding plates **30**. Each slit **114** extends along a transverse direction perpendicular to the longitudinal direction A-A. Each slit **114** includes a first slit **115** and a second slit **116** separated from the first slit **115** along the transverse direction. The base **11** further defines a plurality of depressions **117** recessed from the top surface **111** and a plurality of through holes **118** communicating with the corresponding depressions **117**. The depressions **117** and the through holes **118** are disposed between the first and the second slits **115**, **116**. A longitudinal slot **119** is defined through the bottom surface **112** of the base **11** and is in communication with the through holes **118** for receiving the grounding member **40**.

Referring to FIG. **2**, the signal contacts **20** are configured into several differential pairs for transmitting high speed signals. Each signal contact **20** is configured in pin shaped and includes a fastening portion **21** fixed in the passageways **113** of the insulative housing **10**, a contacting section **22** protruding upwardly into the receiving opening **100** and a press-fit portion **23** downwardly extending beyond the bottom surface **112** of the insulative housing **10**. The press-fit portions **23** are inserted into holes defined in the circuit board **7**.

Referring to FIGS. **3-7**, the shielding plates **30** are assembled to the insulative housing **10** and are disposed between the signal contacts **20** in adjacent columns. Each shielding plate **30** includes a shielding body **31** residing in the receiving opening **100** of the insulative housing **10**, a retaining portion **32** extending from the shielding body **31** and a tab **33** extending from the shielding body **31** as well. The shielding body **31** extends upwardly a predetermined distance for shielding the contacting sections **22** in adjacent columns. The shielding body **31** includes a plurality of finger springs **311** sidewardly protruding into the receiving opening **100** for abutting against the daughter card connector. The retaining portion **32** includes a first part **321** and a second part **322** separated from the first part **321** with the tab **33** disposed between the first and the second parts **321**, **322**. The first and the second parts **321**, **322** are fixed in the corresponding first and the second slits **115**, **116**, respectively. The tab **33** is L-shaped and includes a sideward bending section **331** and an extension **332** bent downwardly from the bending section **331**. The bending section **331** is perpendicular to the shielding body **31** and is located at a horizontal plane. The extension **332** is in parallel to the shielding body **31** along a vertical direction. However, the extension **332** and the shielding body **31** are located at different planes.

The grounding member **40** includes a longitudinal fixation **41** received in the slot **119** of the insulative housing **10**, and a plurality of mounting tails **42** integrally extending downwardly from the fixation **41**. The fixation **41** defines a plurality of notches **410** for receiving the extensions **332** of the shielding plates **30** so that the shielding plates **30** can be firmly abutting against the grounding member **40**. The mounting tails **42** protrude beyond the bottom surface **112** of the base **11** for being mounted on the circuit board **7**. Each mounting tail **42** is aligned with the corresponding press-fit portions **23** of the signal contacts **20** in a nearby column along the transverse direction.

In assembly, the shielding plates **30** and the grounding member **40** are vertically fixed to the base **11** along opposite directions. The bending sections **331** and the extension **332** are received in the depressions **117** and the through holes **118**, respectively. The extension **332** projects into the base **11**. The fixation **41** mechanically touches the extension **332** between the top and the bottom surfaces **111**, **112** of the base **11**.

According to the present invention, no mounting tail is set on the shielding plates **30** so that the structures of the shielding plates **30** can be simplified and assemblies of the shielding plates **30** to the base **11** can be facilitated accordingly. Besides, all the shielding plates **30** are connected by the grounding member **40** with the plurality of the mounting tails **42** as a result that connection between the shielding plates **30** and the circuit board **7** is stably established.

It is to be understood, however, that even though numerous, characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosed is illustrative only, and changes may be made in detail, especially in matters of number, shape, size, and arrangement of parts within the principles of the invention to

the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. An electrical connector for being mounted on a circuit board, comprising:

an insulative housing comprising a base and first and second side walls extending from the base with a receiving opening disposed between the first and the second side walls;

a plurality of signal contacts with contacting sections protruding beyond the base and further extending into the receiving opening, the contacting sections being arranged in parallel columns along a longitudinal direction of the insulative housing;

a plurality of shielding plates assembled to the insulative housing, each comprising a shielding body disposed between the signal contacts of adjacent columns and a tab sidewardly bent from the shielding body, the tab comprising an extension parallel to the shielding body and projecting into the base of the insulative housing, the extension and the shielding body being located at different planes; and

a grounding member touching the shielding plates so that the shielding plates are jointly connected with each other; wherein

no mounting tail for establishing connection between the shielding plates and the circuit board is set on any of the shielding plates; instead, the grounding member comprises a plurality of mounting tails for being connected to the circuit board so as to establish electrical connection between the shielding plates and the circuit board.

2. The electrical connector as claimed in claim **1**, wherein the base comprises a top surface exposed to the receiving opening and a bottom surface for being mounted to the circuit board, the shielding plates being attached to the base through the top surface along a first direction, and the grounding member being attached to the base through the bottom surface along a second direction opposite to the first direction.

3. The electrical connector as claimed in claim **2**, wherein the base defines a slot recessed from the bottom surface and extending along the longitudinal direction, the grounding member comprising a fixation received in the slot, the mounting tails integrally extending from the fixation and further protruding beyond the bottom surface of the base.

4. The electrical connector as claimed in claim **3**, wherein the fixation defines a plurality of notches to receive the extensions.

5. The electrical connector as claimed in claim **4**, wherein each extension mechanically meets the fixation in the base between the top and the bottom surfaces.

6. The electrical connector as claimed in claim **3**, wherein each shielding body resides in the receiving opening and is disposed between the signal contacts of adjacent columns, each shielding plate comprises a retaining portion extending from the shielding body, and the base defines a plurality of slits recessed from the top surface to fix the retaining portions.

7. The electrical connector as claimed in claim **6**, wherein each retaining portion comprises a first part and a second part separated from the first part with the tab disposed between the first and the second parts.

8. The electrical connector as claimed in claim **3**, wherein the tab comprises a sideward bending section from which the extension is bent, the bending section being located at a horizontal plane.

9. The electrical connector as claimed in claim **8**, wherein the tab is L-shaped, the extension and the shielding body being located at different vertical planes.

10. The electrical connector as claimed in claim **8**, wherein the base defines a depression recessed from the top surface to receive the bending section, and a through hole communicating with the depression to receive the extension, the through hole being in communication with the slot.

11. An electrical connector comprising:

an insulative housing including a base, first and second side walls, and a receiving opening jointly formed by the base and the first and the second side walls;

a plurality of signal contacts with contacting sections protruding into the receiving opening, the contacting sections being arranged in parallel columns;

a plurality of shielding plates each including a retaining portion vertically fixed to the base, a shielding body disposed between the signal contacts of adjacent columns, and a tab sidewardly bent from the shielding body, the tab comprising an extension parallel to the shielding body and projecting into the base of the insulative housing; and

a grounding member vertically fixed to the base and defining a plurality of notches to receive the extensions so that the shielding plates are jointly connected with each other via the grounding member; wherein

the shielding plates and the grounding member are fixed to the base from opposite directions; and wherein

the grounding member comprises a plurality of mounting tails for being connected to a circuit board so as to establish electrical connection between the shielding plates and the circuit board.

12. The electrical connector as claimed in claim **11**, wherein the base comprises a top surface exposed to the receiving opening and a bottom surface for being mounted to the circuit board, the base defining a slot recessed from the bottom surface along a longitudinal direction perpendicular to the shielding body, the grounding member comprising a fixation received in the slot, the mounting tails integrally extending from the fixation and further protruding beyond the bottom surface of the base.

13. The electrical connector as claimed in claim **12**, wherein the plurality of notches are defined in the fixation.

14. The electrical connector as claimed in claim **13**, wherein the extension mechanically meets the fixation in the base between the top and the bottom surfaces.

15. The electrical connector as claimed in claim **11**, wherein each tab is L-shaped and comprises a horizontal sideward bending section from which the extension is bent, and the extension is parallel to the shielding body and located at different vertical planes.

16. The electrical connector as claimed in claim **15**, wherein each retaining portion comprises a first part and a second part separated from the first part with the tab disposed between the first and the second parts.

17. An electrical connector for mounting to a printed circuit board, comprising:

an insulative housing;

a plurality of contacts disposed in the housing in matrix with rows and columns perpendicular to each other, each of said contacts defining a mounting tails extending downwardly beyond a bottom face of the housing for mounting to said printed circuit board;

a plurality of shielding plates assembled to the housing to separate said contact in a row direction; and

at least one grounding member extending along a column direction perpendicular to said row direction and intersecting with said shielding plates in an perpendicular and interengagement manner; wherein

a plurality of mounting tails unitarily extend downwardly from the grounding member for mounting to the printed circuit board while the shielding plates are equipped with none of said mounting tails; and wherein

each of said shielding plates defines a tab offset from a primary plane defined by said shielding plate, and the grounding member engages said tab.

18. The electrical connector as claimed in claim **17**, wherein the tab is parallel to the primary plane.

19. The electrical connector as claimed in claim **18**, wherein at least one of said tab and said grounding member defines a notch to receive the other for interengagement therebetween.

20. The electrical connector as claimed in claim **19**, wherein said notch is formed in said grounding member.

* * * * *